

APPLICATION BULLETIN #28



Hi-Pot Testing of High Power Tubes

When testing for high voltage hold-off one should use a current limiting high voltage DC hi-pot tester. (Do not use 50 or 60 Hz AC, as it can physically excite a mechanical resonance that can damage the grids or filament.) This procedure applies to tubes in the 4CV100,000 and 4CV250,000 family. Maximum test voltages and leakage current limits for other tubes that you may need to test can be obtained from the tube manufacturer.

To test for grid to filament shorts or broken filaments: Tie the plate, screen and control grids together, connect to one side of the DC power source, and connect the other to the filament. (Never test with one or more of tube elements floating.) Gradually run the voltage up to the appropriate value for the tube type you are testing. Then reverse the DC polarity and repeat the above procedure. **CAUTION:** Do not exceed 10 kV, and do not exceed 1 mA for more than a few seconds or damage to the tube may occur.

To test the control and screen grid areas: Tie together the anode and the screen grid and apply one DC polarity. Connect the control grid and filament together, and connect the other lead. Again, run the DC voltage up to the appropriate value for the tube type you are testing. Then reverse polarity and repeat the procedure. **CAUTION:** Do not exceed 10 kV, and do not exceed 1 mA for more than a few seconds or damage to the tube may occur.

Lastly, check the anode to screen grid: Connect all tube elements together – filament, control and

screen grids. Connect one DC source to these elements and the other to the anode. Run the DC voltage up to the appropriate value for the tube type you are testing. Reverse the polarity and repeat. **CAUTION:** Do not exceed 3 mA for more than a few seconds or damage to the tube may occur.

During each of these three tests you may experience hi-pot test set kickoffs due to internal tube arcs. Just reset, back off the voltage, and run up again until all the sharp points have been knocked off and gas has been dislodged. Gas is usually knocked loose from internal surfaces during shipping and handling. This is a normal part of tube processing. It can also happen when tubes are physically moved even within the transmitter site.

Reversing the polarity cleans and de-barnacles the surfaces on both sides.

Note 1: When processing a tube, be aware that high humidity conditions may cause higher readings due to the conductivity changes on the external ceramic or glass insulator's surface.

Note 2: A number of suitable high voltage testing units are available. One recommended units is the Hipotronics H800PL. **CAUTION:** Follow all safety procedures specified in the manufacturer's test equipment manual. Discharge the tube between tests.

Note 3: Do not hi-pot tubes in the transmitter socket. Damage to other components will occur.

Maximum Allowable Leakage at Specified Test Voltage

	4CV250,000B/C	4CW150,000E	4CV100,000C	4CX35,000C
H.V. Standoff Fil – G ₁	6.5 kV, 1 mA	6.5 kV, 1 mA	6.5 kV, 1 mA	6.5 kV, 1 mA
H.V. Standoff G ₁ – G ₂	8.0 kV, 1 mA	8.0 kV, 1 mA	8.0 kV, 1 mA	8.0 kV, 1 mA
H.V. Standoff G ₂ – Anode	60 kV, 3 mA	60 kV, 3 mA	60 kV, 3 mA	60 kV, 3 mA

For test values on other tubes, please contact the Eimac factory.